A Survey of Blockchain-enabled Land Registry Management System: Research Trends, Issues, and Future Challenges

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Abstract: Land Registry Management System (LRMS) is an administrative system used to record and monitor dealings with real estate. The land registration system is a critical component of a revenue department as it holds the records of lands and their owners. Registration, transfers of ownership, and the issuance of declaration certificates are just a few of the many functions performed by the LRMS. Many people and organizations are involved in the land registration process, as well as government agencies and finance divisions, making navigating difficult. In many countries, land records are stored in paper form at centralized locations, making them vulnerable to forgery. Moreover, the centralized system has a performance bottleneck, a single point of failure, a double-spending problem, and non-transparency. This research focuses on identifying the relationship between blockchain technology and the land administration system. Property document and stamp duty evasion fraud are common in Indian financial and corporate transactions and other government machinery. Increased property transaction frequency in most registry offices carries the risk of fraud, compelling society to demand transaction transparency. Governments worldwide are beginning to investigate the potential benefits and risks associated with integrating blockchain-based applications into public services. Blockchain-based decentralized financial services solutions are not only secure but are also consistent in their state. Additionally, it has the potential to increase the efficiency of government operations by improving the delivery of public services and building trust in public infrastructure. This article presents the comparison of state-of-the-art solutions and their problems in detail. Finally, research challenges and issues in blockchain-enabled land registry management systems are explored.

Keywords: Blockchain Technology, Land Registry, Real State, Consensus, Sidechain, Searching Research Challenges.

1. Introduction

In this modern era, edge-cutting technology has made rapid strides in almost every field, such as e-commerce, industries, administration, government, healthcare, finance, education, etc. All these fields require a lot of effort for processing of records and documents [1 & 2]. Before digitalization started becoming the norm, all around the world, storage and processing of documents was not only expensive but also tedious and fragile, as it comprises of various static procedures, which were earlier done manually and later authorized at every level [3]. Inaccurate data, fake/forgery records, verification/search issues due to physical documents, data redundancy, and records damage due to natural disasters are just a few examples of human errors or typographical mistakes that can occur during the data entry and authorization process. Even if it is extracted safely after all these calamities, the major issue that data faces is synchronization, which further leads to inconsistencies and mismatches.

Poor control over data processing and record-keeping affects the management of the governance in any country due to the centralization of records. Further other major drawbacks of centralized records pose major challenges. Physical documents are not always readily available to end-users, one may have to wait before reviewing a file, mainly if kept at a different office location. Second, recording centralized data requires investment in high density shelving, and its management and proper upkeep also incurs significant expense by employing full time staff. As a result, physical data is tough to maintain and administer as it comes at a high cost [4 & 5]. Finally, it is at mercy of administrator.

Further, to ensure transparency to the e-governance system, governments across the world are fostering the digitization of records and digital transactions. Even though technological advancements boost the system's effectiveness and performance, they aren't without their drawbacks. Many types of network attacks can compromise digital documents [6]. Since altering the content of digital records is simple, even official information can be changed. The problems of document preservation, accessibility, and scalability in the digital age are additional obstacles. It is incumbent upon businesses to offer safe havens for their digital documents and to keep close tabs on who has access to them. Certain important but vulnerable digital documents pertain to real estate, financial, healthcare, education, governance, supply chain [7].

To offset some of the major challenges, many researchers have contributed to secure and authorized content retrieval or tamper-free access/storage methods. One such groundbreaking technology is blockchain. Bitcoin, the most valuable cryptocurrency by market cap and the most well-known blockchain concept implementation, has been decentralized since 2009. This system uses a P2P architecture to connect users directly. Currently, there are over 15 million bitcoins in circulation, and their market value is close to 8 billion Euros. The UTO Set can be calculated with Bitcoin's decentralized transaction ledger [22, 23, 24, and 25]. This concept of bitcoin has been researched by the financial industry and researched as Digital Ledger Technology (DLT).

A land registry management system is an administrative system used to record and monitor dealings with real estate. Investment and economic opportunities can be boosted by owning land. It's crucial because it's one of the main ways that federal and state governments bring in money through taxation. Registration, transfers of ownership, and the issuance of declaration certificates are just a few of the many functions performed by the Land Registry Management System (LRMS). There are many people and organizations involved in the land registration process, as well as government agencies and finance divisions, making it a difficult one to navigate. In many countries, including India, Bhutan, Nepal, Bangladesh, Pakistan, etc., land records are kept on paper at a single location. In addition to being vulnerable to both natural and man-made disasters, the use of intermediaries in this paper-based system makes it impossible to guarantee the integrity of the data being stored. Furthermore, corruption is enabled in the current system because the information is dispersed across numerous government agencies that need better synchronization.

The digital documents like ID proof, address proof, land registry document, e-cheque are vulnerable to alteration, tempering, and even ownership of the documents can be changed. Thus, there still remain several security concerns around these documents [19 & 20]. Organizations must offer safe places to keep digital records and allow only authorized personnel access [21]. There is an increased risk of data loss and increased network load due to the reliance on a central data repository.

6. Conclusion

In India, keeping land records and regularly updating them has proven to be complicated. The people have so little faith in the government that they refuse to use the systems already in place. Many citizens still determine their land ownership status even with a proper sale deed. Some people want to buy land but are still deciding if the seller has title to the land. Unfortunately, there needs to be more coordination between different government offices involved in land records management, making the process tedious and time-consuming. Legitimate benefits are fraudulently obtained through official paperwork fraud by corrupt officials. Many forms of manipulation are possible at every stage of the traditional paper-based system, which indirectly affects the system's apparent openness. Improvements to the land administration system have been suggested through the use of digitalization, according to studies. Still, digital systems have yet to prove to be a foolproof answer to the problems that have arisen.

The clarity in land ownership and valuation and a decrease in fraudulent transactions are just a few benefits that could result from implementing blockchain technology into the land registration process. The country's GDP will rise due to improved land management and conveyance made possible by this. The article recommends using smart contracts to take advantage of blockchain's inherent benefits. Each property transfer (purchase, inheritance, court order, land acquisition, etc.) will be recorded in the system and preserved for all time. This means that you can see the status of your property records at any time and have complete confidence in their accuracy thanks to their near-constant updating and complete audit trail. This will establish an authoritative central repository for all information relevant to the transfer of property ownership. A conclusive land management system with a title guarantee can be set up in the country. This will give buyers and sellers peace of mind by eliminating the chance of forgery and disputes and the costs and time involved in each transaction. This article compared and contrasted the features of several cutting-edge blockchain-based solutions. Finally, some difficulties encountered during research into and implementing blockchain in the relevant field are covered.

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